15. The mass spectrometer as recited in claim 14, wherein said inner surface comprises a portion between said ion source and said ion mirror.

16. The mass spectrometer as recited in claim 15, wherein said front electrode faces said ion source and said ion detector faces said front electrode.--

REMARKS

Claims 1-16 remain in the case.

Claim 1 has been rejected under 35 U.S.C. 102(e) as being anticipated by Zhang et al. "A Novel Non-linear Ion Mirror with Only Three Elements".

Applicant's mass spectrometer as recited in claim 1 includes a flight tube and a three electrode ion mirror integral with the flight tube for retarding and reflecting ions from the ion source. As defined in the specification, the mirror is "integral" with the flight tube in that it is disposed or positioned in or on, attached to, adapted to or a permanent part of the flight tube. This enables each of the electrodes in the ion mirror to be easily aligned and mounted with permanent high precision and accuracy relative to the flight tube and other elements of the mass spectrometer.

The applied reference of Zhang et al. does not disclose a mirror integral with a flight tube or suggest such a combination. Since none of the remaining references of record show an ion mirror integral with a flight tube, there is no suggestion of modifying Zhang et al. by making the three electrode ion mirror of Zhang et al. integral with a flight tube. It would appear, therefore, that claim 1 is patentable over the reference of Zhang et al. taken alone or in combination with any of the other references.

Claims 2-6 are dependent from claim 1 and would appear to be allowable along with their parent claim.

Claim 7 has been rejected under 35 U.S.C. 102(e) as being anticipated by the reference of Zhang et al. referenced above.

Claim 7 is directed to a three electrode ion mirror integral with a flight tube. Since the ion mirror of Zhang et al. is not integral with a flight tube, claim 7 is believed to be patentable over Zhang et al. for the same reasons given in support of the patentability of claim 1.

Claims 8-11 are dependent from claim 7 and are believed to be patentable along with their parent claim.

Claims 12 and 13 have all of the limitations of claim 7 and are believed to be patentable over the reference of Zhang et al. for the same reasons given in support of the patentability of claim 7. In addition, claim 12 specifies that the ion mirror is fixed to the insulated inner surface of the flight tube as in the embodiment of the invention described in the last paragraph of page 6 of the specification.

Claim 13 further specifies that the ion mirror is located at one end of the flight tube as shown in FIG. 1.

Claim 14 is similar to claim 12 with respect to the ion mirror and flight tube combination recited in claim 12 as applied to a mass spectrometer. Claim 14 is believed to be patentable over the cited references for the same reason given in support of the patentability of claim 12.

Claims 15 and 16 are dependent from claim 14 and are believed to be patentable along with their parent claim.

In view of the amendments to the specification, it is felt that this application is in condition for a Notice of Allowance.

Should the Examiner have any question or reservations about this response, he is invited to contact the undersigned at his Worcester, Massachusetts office at 508-753-5533.

Respectfully submitted,
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APPENDIX

In the Specification:

Page 7, line 11, delete the paragraph beginning "The grid plate 23..." and substitute the following paragraph:

-- The grid plate 23 is designed to contact the front electrode 9 and comprises an aperture 24 for receiving and reflecting ions, as well as a grid frame 31. The grid plate 23 is attached to the flight tube 8 by means of a fastener [33] (not shown in FIGS.), and has an aperture 24 that the grid frame 31 is stretched across. The grid frame 31 is attached to the ion mirror 5 and can be as large as the aperture is required in practice. The grid frame 31 also serves as an internal electrostatic shield. In order to minimize field penetration of the electric field into the flight tube 8, the grid frame 31 is attached to the internal side of the front electrode 9. The ion mirror 5 also comprises a first end 21 for receiving and transmitting ions substantially along the longitudinal axis 19 of the ion mirror 5, and second end 22 that is closed ended. As described above, the second end 22 is closed ended by attachment of the back plate 35.--

Page 7, line 22, delete the paragraph beginning "Referring to FIGS. 1-3..." and substitute the following paragraph:

-- Referring to FIGS. 1-3, the electrodes 9, 11 and 13 are integral to the flight tube 8. Each of the electrodes 9, 11 and 13 is [are] designed for receiving ions and creating an electric fields that retards and reflects ions back towards the flight tube 8 and the ion detector 7. The ion mirror 5 has internal conducting segments L1, L2 and L3, L1, L2 and L3 define the length of the electrodes 9, 11 and 13, respectively. Segment L1 is extended past the grid frame 31. L1 and L2 are approximately similar in size and shape. The electrodes 9 and 11,

11 and 13 are separated by first space 12 and second space 14 respectively. The lengths of L1, L2 and L3 may be altered to produce varying electric fields. Segment L2 has its electrical connection by means of a single hole in the flight tube 8 (not shown in FIGS.). L3 serves as the rear segment and is in electrical contact with the back plate 35. The invention and segment design, number, size and material (resistive or conductive) can be varied to suit conventional multi-segment designs or new layouts as needed. In addition, the aspects of the invention may be applied or are applicable to other components like the ion pulser 4 which is traditionally built from a "stack" of separate parts like the mirror, and charged particle lenses (e.g. Einzel lenses) and deflectors etc. The above invention also has application in ion mobility spectrometers.--